WINZLER & KELLY
CONSULTING ENGINEERS

Ref: 90-1297-01049

December 12, 2005

Robert Stone & Mark Verhey
Humboldt County Department of Health and Human Services
Division of Environmental Health
100 H Street, Suite 100
Eureka, CA 95501

Re: Workplan for Additional Subsurface Investigation at the Former Dutra Trucking Facility, 5005 Boyd Road, Arcata, California. LOP # 12264

Dear Messrs. Stone and Verhey:

This Workplan proposes a methodology for answering outstanding site investigation questions at the former Dutra Trucking Facility in Arcata. These questions presented below were discussed between the three of us on July 1, 2005, to obtain data to explain anomalous project findings and field data. This Workplan addresses the following tasks to be performed:

- Investigate further the source of water to the former UST excavation and MW-2, MW-3, and MW-5. Inquire about locations of sanitary sewer, septic systems, storm sewers, water distribution pipes, and other possible sources of water and contaminants to the subsurface.
- Sample water and flow rate in Caltrans culvert inlet and outlet adjacent to Dutra property and analyze for gasoline and diesel range hydrocarbons.
- Use trenches to evaluate leakage from drainage pipe and possible upgradient contaminant sources.
- Install deeper monitoring wells down gradient from former UST excavation.

If you have any questions or comments, please do not hesitate to call.

Sincerely,
WINZLER & KELLY

Kenneth Thiessen, CEG #2224
Certified Engineering Geologist

Attachments

c: Mr. Frank Dutra
P.O. Box 898
Willow Creek, California 95573

WORKPLAN FOR ADDITIONAL SUBSURFACE INVESTIGATION AT THE FORMER DUTRA TRUCKING 5005 BOYD ROAD, ARCATA, CA LOP #12264

December 2005

Prepared for:

Mr. Frank Dutra
P.O. Box 898,
Willow Creek, California 95573

Prepared by:

Winzler & Kelly, Consulting Engineers
633 Third Street, Eureka, California 95501-0417
(707) 443-8326

WORKPLAN FOR
ADDITIONAL SUBSURFACE INVESTIGATION AT THE FORMER DUTRA TRUCKING
5005 BOYD ROAD, ARCATA, CA
LOP #12264

Project No. 90-1297-01049

Prepared for:

Mr. Frank Dutra
P.O. Box 898,
Willow Creek, California 95573

Prepared by:

Colleen Ellis
Staff Geologist

Reviewed by:

Kenneth Thiessen, C.E.G. #2224
Project Manager

CERTIFIED ENGINEERING GEOLOGIST
KENNETH R. THIESSEN
No. 2224
Exp. 10/31/06
STATE OF CALIFORNIA

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December 2005

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APPENDICES

1.0 INTRODUCTION

Winzler & Kelly Consulting Engineers, on behalf of Mr. Frank Dutra, has prepared this *Workplan for Additional Subsurface Investigation at the Former Dutra Trucking Site*. The work proposed here was requested by the Humboldt County Division of Environmental Health (HCDEH) following a field meeting with personnel from Winzler & Kelly and the HCDEH on July 1, 2005. Winzler & Kelly wrote a letter to the HCDEH dated July 6, 2005, summarizing the field meeting and answered several outstanding questions based on a July 5, 2005 meeting with Frank Dutra. A letter dated July 7, 2005, from the HCDEH requested that a workplan be prepared to answer outstanding questions about the site. These letters are included as Correspondence in Appendix A of this Workplan. This Workplan was prepared for submittal to the HCDEH for their review and approval to answer the remaining site questions.

1.1 Objectives

The objectives of the proposed scope of work are to **1)** identify the source of contamination reported in monitoring wells MW-2 and MW-3, **2)** determine if the nearby storm drain acts as a preferential pathway for migration of contaminants from offsite, and 3) determine if groundwater has been impacted down gradient of the former Underground Storage Tanks (USTs).

1.2 Site Location

The subject property is located at 5005 Boyd Road, which is situated northeast of the Giuntoli Lane intersection with Highway 299, Arcata, California. The Vicinity and Site Maps are included as Figures 1 and 2 (Appendix B). Surrounding properties are light industrial, commercial, and residential. The Mad River is located approximately 500 feet northwest of the former UST location. The properties adjoining Boyd Road are essentially flat, presumably having been filled as needed to create level ground. Storm water drainage from the Boyd Road area to the Mad River is via ditches and storm sewer pipes.

1.3 Facility Description

As shown on Figure 2 (Appendix B), structures on the property consist of a main shop warehouse, a paint shop, a Caltrans field office, and a small office building. Most driving and parking areas near the structures are paved with asphaltic concrete; however, a large portion of the site is unpaved and covered with gravel. The northern portion of the property is used for storing and dispensing diesel fuel to trucks and equipment. This fueling facility consists of above ground storage tanks within a secondary containment structure and a diesel fueling island. The main shop warehouse building is used for the distribution of baked goods. A water well is located at the northern corner of the property and is used for washing trucks only. The site is served by public utilities for potable water and sewer. The area northwest of the Dutra site, adjacent to the bank of the Mad River, is used as a concrete and aggregate business.

When used by Dutra Trucking, the site operated one 7,500 gallon gasoline UST and four diesel USTs ranging in capacity from 5,000 to 10,000 gallons all previously located within a common excavation. The fuel dispensers supplied by these five USTs were previously located on grade above the UST excavation. There are currently no USTs at the site. The former UST excavation is bisected by an east/west trending chain link fence located immediately north of monitoring well MW-3 (see Figure 2, Appendix B).

1.4 Local Hydrogeology

Arcata receives approximately 40 inches of rainfall annually. Storm water flows off the paved portion of the Dutra property and percolates into adjacent fill material and soil. The site is located approximately where the Mad River empties onto the coastal flood plain. The nearly flat site is located on the floodplain southeast of the Mad River. Gently to moderately sloping hills lie north, west, and east of the site. Shallow soils (surface to 25 feet below ground surface) generally consist of over-bank clay, silts, and very fine sands based on soil stratigraphic logs for borings drilled during the January 2002 and November 2003 investigations. Soil stratigraphy below the total explored depth of 26.5 feet below ground surface (bgs) is not known, although, deposits of sand and gravel are likely present.

Groundwater at the site has been encountered at depths from 7.55 feet bgs to greater than 24 feet. The calculated groundwater gradient flows in a northwest direction at a gradient of 13-21 feet per 100 feet toward the Mad River or eastward away from the Mad River at 16 feet per 100 feet (Table 1, Appendix C). This calculated groundwater gradient far exceeds the slope of the ground surface of the site and the periodic contrary gradient direction may be explained by perched groundwater intercepted by only some of the site monitoring wells. The static depth to groundwater in the site's production well is approximately 30 feet.

1.5 Background Information

This site was formerly occupied by Dutra Trucking Company. On May 14 and 15, 1990, five fuel USTs were removed from a common excavation under closure permit #115889. The tanks and contents were listed as follows:

TANK	VOLUME	CONTENTS
#1	7,500 gal	Gasoline
#2	6,300 gal	Diesel
#3	5,000 gal	Diesel
#4	10,000 gal	Diesel
#5	10,000 gal	Diesel

The USTs had previously passed the National Fire Prevention Association (NFPA) criteria for tank testing on June 14, 1988. All of the tanks were noted as being free of holes and in good condition upon removal. Diesel impacts were noted in soil adjacent to the fill ends of the tanks. The common tank hold was remediated by over-excavating soil to depths ranging from 10 to 16 feet. Eight soil samples collected from the excavation floor contained Total Petroleum Hydrocarbons as Diesel (TPH-D) at concentrations ranging from 2.0 to 5.0 parts per million (ppm). One portion of the tank hold was further excavated to a depth of 21 feet. One soil sample at that depth contained TPH-D at a concentration of 1.5 ppm. Groundwater was not encountered during UST removal at the total during UST removal at the total explored depth of 21 feet bgs. Results of soil analytical results for samples collected during UST removal activities are presented in Table 2, contained in Appendix B.

Approximately 240 cubic yards of excavated soil were removed from the excavation to stockpiles. Subsequent sampling of the stockpiles indicated TPH-D was present at concentrations ranging from 160 to 1,600 ppm with some detections of TPH-as gasoline (TPH-G) ranging from 21 to 56 ppm. In 1998, the stockpiled soil was approved by the HCDEH for use as fill on this site.

Winzler & Kelly implemented the initial subsurface investigation on January 28 and 29, 2002. A total of five soil borings were drilled. Soil and/or groundwater samples were collected from the borings and an onsite production well. Total petroleum hydrocarbons as motor oil, gasoline (TPH-MO, TPH-G), and TPH-D were detected up to 320 ppm in soil samples collected from boring B-3. The laboratory provided notes suggesting that the TPH-MO and TPH-G results did not exhibit typical peak patterns and probably represented diesel constituents. All other tested constituents in all other soil samples were below laboratory detection limits. TPH-D was also detected in a groundwater sample obtained from boring B-3 at a concentration of 180 parts per billion (ppb) (see Table 3, Appendix C). All other groundwater sample constituents tested remained below laboratory detection limits. Concentrations of all tested analytes were below laboratory detection limits in the groundwater sample collected from the onsite production well.

Groundwater samples were obtained from a duplicate boring B-3 again in December 2002. The results demonstrated a marked increase in TPH-D and TPH-MO analytical results. TPH-D results rose from 180 ppb in samples obtained in January 2002 to 21,000 ppb in samples obtained during the December 2002 sampling event, while TPH-MO results rose from non-detect to 6,500 ppb (Table 3, Appendix C).

To define the northern extent of impacted soil and groundwater and to facilitate monitoring of groundwater conditions in the vicinity of the former USTs, five groundwater monitoring wells were installed in November 2003. Analytical results for soil samples collected during the installation of MW-1, MW-2, MW-4, and MW-5 had all tested constituents below laboratory detection limits. Soil samples from MW-3 had concentrations of TPH-D (up to 460 ppm), TPH-MO (up to 100 ppm), and TPH-G (up to 38 ppm) detected in samples collected from 6.0 and 11.5 foot depths (Table 2, Appendix C). In mid-December 2003, the wells were developed. In February 2004, MW-1, MW-2, MW-3, and MW-5 were sampled. MW-4 was dry, and was not sampled. Concentrations of all tested analytes, excluding TPH-D in monitoring well MW-3, remained below laboratory detection limits. TPH-D was detected at a concentration of 320 ppb in the groundwater sample obtained from monitoring well MW-3. These results and all other groundwater sampling results can be found in Table 3 in Appendix C.

2.0 PROPOSED FIELD ACTIVITIES

In an effort to meet the objectives of this *Workplan*, Winzler & Kelly proposes the installation of deeper monitoring wells down gradient from the former UST excavation, in the vicinity of MW-1 and MW-4. Winzler and Kelly also proposes to sample storm water in the Caltrans culvert inlet at at Boyd Road and the Mad River outfall, and to trench along the storm drain pipe to determine if it acts as a preferential pathway for migration of contaminates from offsite, further investigation will be performed to determine if an offsite source of contaminants may be affecting the former Dutra property.

The following actions are recommended for implementation via this Workplan. Many of these actions were recommended in Winzler & Kelly's *Quarterly Groundwater Monitoring Data for March 2005 and Project Summary*, dated June 2005, and our *Results of Additional Field Investigations, July 2005.*

- To determine if the aquifer beneath the site has been impacted from perched water impounded in the former tank excavation, install monitoring wells in the vicinity of existing monitoring wells MW-1 and MW-4. The proposed wells will be approximately 40 feet deep. Groundwater data from the proposed well near the MW-1 location will provide data on groundwater in the down gradient direction from the former UST excavation. Groundwater data from the proposed well near the MW-4 location will determine if residual contaminants are migrating toward the production well located north of the former UST excavation.
- Contamination was first detected in monitoring well MW-2 during the March 2005 sampling event. Continue periodic sampling of MW-2.
- Continue periodic sampling of MW-3 within the former UST excavation to determine the trend of dissolved TPH-D.
- Request that groundwater samples analyzed for TPH-D laboratory be performed with and without silica gel cleanup.
- Prepare a soil and groundwater contingency plan.
- Properly dispose of all remaining drummed investigation-derived wasted on site.
- Investigate further the source of water to the former UST excavation and MW-2, MW-3, and MW-5. Inquire about locations of sanitary sewer, septic systems, water distribution pipes, and other possible sources of water to the subsurface.
- Sample water in Caltrans culvert inlet at Boyd Road when surface water is available and analyze for gasoline and diesel range hydrocarbons. If possible, determine flow of water in Caltrans culvert at inlet and compare with outlet flow.
- Use trenches to obtain soil and water samples to evaluate possible leakage from drainage pipe and possible upgradient or offsite contaminant sources.

2.1 Project Preparation

Once this workplan has been approved, Winzler & Kelly will mark the proposed trenching areas and well locations and Underground Services Alert (USA) will be notified at least 48 hours prior to the field event so that USA could arrange for utility companies to mark buried utilities near the proposed work areas. The site owner will also be consulted as to the possible presence of utilities in the work area. Drilling permits will be obtained from the HCDEH prior to installation of monitoring wells. The HCDEH will be notified at least five working days prior to prior to beginning field activities.

2.2 Trenching

The proposed trenches will be dug with a backhoe between the storm sewer pipe and the former UST excavation. Two trenches will be dug, sampled, and then backfilled within 72 hours of sampling. Figure 3 in Appendix B shows the approximate proposed location of the trenches. A minimum of two soil samples and one water sample will be collected from each trench. TPH-D analyses will be performed with and without silica gel cleanup to determine if naturally occurring, non-petroleum hydrocarbons are reflected in reported results.

2.3 Monitoring Wells

Two monitoring wells will be installed down gradient from the former UST excavation, in the vicinity of MW-1 and MW-4, by a C-57 licensed drilling contractor, and in accordance with Winzler and Kelly's Standard Operating Procedures (SOPs) for *Monitoring Well Installation and Development*. The Winzler and Kelly's SOPs are included in Appendix D. Figure 3 in Appendix B shows the approximate proposed location of the two monitoring wells. The wells will be drilled using a truck-mounted hollow-stem auger drill rig, to depths of approximately 40 feet bgs. Using a split spoon sampler, soil samples will be collected in brass tubes at five-foot intervals, zones of obvious contamination, changes in lithology, and at the potentiometric surface of the water table. Groundwater is anticipated to be encountered at approximately 30 feet bgs based on previous depth to groundwater measurements in on-site production well. The wells will be completed with 2-inch diameter PVC casings with 0.020-inch factory slotted screens extending from approximately 40 feet bgs to 25 feet bgs. From 25 feet to the surface, the wells will be sealed to exclude perched water from entering the well and aquifer. The well annulus will be packed with #2/12 or equivalent sand from total depth to at least 6 inches above the screened interval. The top of the well will be protected with a locking well plug and a traffic-rated well head box.

The borings will be logged in accordance with the United Soil Classification System and using the Munsell Soil Color Chart. Drill cuttings and wastewater generated by decontamination procedures will be stored in a Department of Transportation approved 55-gallon drums.

The location of the two additional wells shall be surveyed according to the State of California's Geotracker standards. Results will be reported to the Geotracker database.

2.4 Soil Sampling/Analysis

Soil samples from the well borings will be collected in accordance with Winzler and Kelly's SOP for *Soil and Water Sampling from a Boring* (Appendix D). One soil sample will be submitted for a duplicate analysis by the laboratory. Soil samples collected from the borings and the trenches will be stored in a cooler on ice and transported to North Coast Laboratories, a State Certified Laboratory, via proper chain-of-custody documentation for the following analysis:

- TPH-D/MO with silica gel cleanup by EPA Method 3510/3550/3630 GCFID
- TPH-D/MO by EPA Method 3510/3550 GCFID

- BTXE/MTBE/TPH-G by EPA Method 8015B GCFID
- Five Oxygenates (TBA, MTBE, DIPE, ETBE, TAME) by EPA Method 8260B

2.5 Quarterly Groundwater Sampling/Analysis

No sooner than 48 hours after the placement of the well seals, the wells will be developed according to Winzler and Kelly's SOP for *Monitoring Well Installation and Development* (Appendix D). After well development and purging, groundwater samples will be collected from each of the onsite wells in accordance with the Winzler and Kelly's SOPs for *Monitor Well Purging and Sampling Activities* (Appendix D). The proposed groundwater monitoring program will consist of a total of four subsequent quarterly groundwater sampling events.

Water samples from each monitoring well and from the trenches will be submitted to a State certified laboratory for the following analysis:

- TPH-D/MO with silica gel cleanup by EPA Method 3510/3550/3630 GCFID
- TPH-D/MO with silica gel cleanup by EPA Method 3510/3550/3630 GCFID
- BTXE/MTBE/TPH-G by EPA Method 8021B/5030 GCFID
- Five Oxygenates (TBA, MTBE, DIPE, ETBE, TAME) by EPA Method 8260B.

3.0 QUALITY ASSURANCE / QUALITY CONTROL

Quality Assurance and Quality Control (QA/QC) for fieldwork shall be provided by adherence to this Plan and to the Winzler & Kelly's SOPs as listed in Appendix D. In addition, all soil and water samples shall be held in chilled coolers for transport to State certified analytic laboratories via proper Chain of Custody.

All water samples submitted to a laboratory shall be accompanied by a QA/QC sample consisting of a travel blank, field blank, or duplicate sample. At least one field sample will be submitted for duplicate laboratory analysis to evaluate the reproducibility of analytic performance.

Laboratory QA/QC shall include the use of a "method blank" sample analysis for each analyte to verify the absence of false positive readings and the analysis of "Laboratory Control Spike" samples to evaluate the "percent recovery" for each analyte. All laboratory reports shall be signed by the director of the laboratory.

4.0 SITE SAFETY PLAN

All field activities will be performed in accordance with this workplan and the Site Safety Plan found in Appendix E.

5.0 REPORT OF FINDINGS

Upon completion of all of the proposed field activities and receipt of all analytical data, a Report of Findings will be prepared and submitted to the HCDEH. The Report will include a description of of the field activities performed, a discussion of the findings, tabulated data, boring logs, a figure showing the surveyed well locations, the laboratory data sheets, and conclusions and recommendations for this UST case.

6.0 ANTICIPATED SCHEDULE

Upon receipt of approval of this workplan from the HCDEH, Winzler & Kelly will request driller bids and prepare a cost estimate for the expected costs to implement this workplan to satisfy USTCF requirements. Once approval has been obtained, the permitting process with HCDEH and the contracting of a drilling contractor will be initiated. It is the intent that fieldwork be completed as soon as possible and the Report of Findings be completed within 45 days following receipt of all of the analytical and survey data.

- December 2005. Submit Workplan to HCDEH
- January 2005. Receive Workplan comments and/or approval from HCDEH.
- February 2005. Solicit bids to perform Workplan from subcontractors. Assemble project budget. Submit budget amendment to client for approval.
- March 2005. Perform quarterly groundwater monitoring and gauging. Apply for excavation and drilling permits.
- April 2005. Receive permits. Schedule fieldwork.
- May 2005. Perform trenching and well installation. Perform second quarterly groundwater monitoring and gauging event.
- July 2005. Assemble data into Report of Findings. Submit report to regulators.
- August 2005, Perform third quarterly groundwater monitoring and gauging event, if needed.
- Provide Project Summary Report and Site Conceptual Model to HCDEH.

7.0 DISTRIBUTION

Mr. Frank Dutra
P.O. Box 898
Willow Creek, California 95573

Robert Stone and Mark Verhey
Humboldt County Department of Public Health
Division of Environmental Health
100 H Street, Suite 100
Eureka, California 95501

Appendix A
Project Correspondence

Humboldt County Department of Health and Human Services
DIVISION OF ENVIRONMENTAL HEALTH
100 H Street - Suite 100 - Eureka, CA 95501
Voice: 707-445-6215 - Fax: 707-441-5699 - Toll Free: 800-963-9241
envhealth@co.humboldt.ca.us

July 7, 2005

Frank Dutra
PO Box 898
Willow Creek, CA 95573-0898

Subject: **Former Dutra Trucking Site**
5005 Boyd Rd, Arcata, California
LOP #12264

Dear Mr. Dutra:

Thank you for the June 1, 2005 *Quarterly Groundwater Monitoring Data for March 2005 and Project Summary* prepared by Winzler & Kelly Consulting Engineers (W&K). I concur with the recommendations to continue groundwater sampling and monitoring with analysis for diesel with the silica gel cleanup procedure.

Based on a recent meeting and site visit with Ken Thiessen, I understand Winzler & Kelly will be preparing a workplan to conduct additional subsurface investigation. The purpose of this workplan will be to obtain additional information needed to evaluate this site for regulatory closure. The scope of work will include the installation of additional soil borings and/or monitoring wells to:

- Identify the location of previous dispenser and product delivery lines,
- Investigate and identify the source of the contamination reported in monitoring well MW-3 and MW-2,
- Investigate the potential for the nearby storm drain to act as a preferential pathway for migration of contaminants from off site or source unrelated to the former USTs, and
- Confirm that groundwater has not been impacted downgradient of the former USTs in the vicinity of MW-1 and MW-4.

Please contact me at 707.268.2239 if you have any questions.

Sincerely,

Robert Stone, CHMM
Hazardous Materials Specialist
Local Oversight Program

cc: Ken Thiessen, Winzler & Kelly

12264.016/135L

KT

WINZLER & KELLY
CONSULTING ENGINEERS

July 6, 2005

Ref: 90-1297-01.049

Robert Stone & Mark Verhey
Humboldt County Department of Health and Human Services
Division of Environmental Health
100 H Street, Suite 100
Eureka, CA 95501

Re: Results of Additional Field Investigations, July 2005
Former Dutra Trucking Facility, 5005 Boyd Road, Arcata, California. LOP # 12264

Dear Messrs. Stone and Verhey:

Thank you for meeting with me at the former Dutra Trucking Facility in Arcata last Friday, July 1, 2005, to discuss previously reported project findings and anomalous field data. From this field meeting, we identified the following task items to be performed:

- Identify the entry, course, and outfall of 36 inch storm drain pipe.
- Identify the location of dispenser islands serving the five former diesel and gasoline USTs.
- Gauge monitoring wells and production well now during summer dry period.
- To provide means to sample groundwater down gradient from the former UST excavation, consider utility of installing deeper wells.
- Determine if storm drain pipe is source of water to former UST excavation and wells MW-2, MW-3, and MW-5 using borings or backhoe trench. Consider installing borings or wells upgradient of former UST excavation to determine if diesel and gasoline contamination is entering Dutra property from upslope source.
- Determine if additional source of hydrocarbons is present producing persistent and fluctuating gasoline and diesel contaminant results from groundwater samples collected within the former UST excavation (MW-3).
- Observe that river's edge has prograded with the addition of waste concrete, soil and aggregate in vicinity of former Dutra Trucking facility.

633 Third Street, Eureka, CA 95501-0147
tel 707.443.8326 fax 707.444.8330
www.w-and-k.com

Meeting with Frank Dutra

On July 5, 2005, I met with Frank Dutra to discuss project progress. During this conversation, Mr. Dutra told me that following construction of the freeway segment of Highway 299, Caltrans installed a 36 inch diameter concrete culvert beneath Boyd Road to dispose of runoff water from the freeway. This culvert drained to a drainage ditch on the Dutra property. This runoff water frequently exceeded the capacity of the ditch and resulted in ponding and mud on the Dutra property. Frank Dutra contracted to have the Caltrans culvert connected to a below-grade pipe with a river outfall. Dutra used 36 inch concrete pipe to match the Caltrans material for this work.

The 36" pipe runs alongside the former UST excavation, beneath the road access to the truck fueling station at the back of the former Dutra property and on to the river outfall as we observed. The approximate route of this pipe is drawn on Figure 1. Apparently, modification of the river's edge necessitated the addition of the 36" poly pipe at the river outfall observed by Verhey. Frank Dutra believes that leaky joints in this segmented 36" drain pipe may be responsible for the water observed in former UST excavation and in MW-2, MW-3 and MW-5. This drainage from the freeway may be a source of fluctuating diesel and gasoline contamination concentrations observed in MW-2 and MW-3.

Mr. Dutra informed me that the former dispensers serving the former diesel and gasoline USTs were located atop the UST s, approximately above the centrally located gasoline UST. All product piping, dispensers, tanks and vent lines were removed at the time of UST system decommissioning in 1990.

July 5, 2005 Field Visit

On July 5, 2005, Ken Thiessen of Winzler & Kelly visited the former Dutra facility to follow-up on questions identified above. Work performed included:

1. **Gauge depth to water in production wells located at the north end of truck fueling facility.**

   Results: An electronic water gauging tool was inserted into the well head. The depth to water measured was 30.29 feet below the top of the well head at 4:12 PM. The wash down hoses that use water from this well did not appear to have been used on July 5 as the soil within the radius of the hoses was dry, thus the gauge depth appears to represent approximately static conditions at this well.

2. **Gauge depth to water in the five monitoring wells.**

   Results: Wells were opened and allowed to stabilize for approximately 15 minutes before water levels were measured using an electronic water gauging tool. These gauge data were taken following a warm period without measurable rainfall in the past two to three weeks. As has been consistent with the trend for this site, the three wells nearest the drain pipe, MW-2, MW-3, and MW-5 produced water at depths of 14.29 feet, 12.40 feet, and 18.25 feet, respectively. The 25 foot deep wells MW-1 and MW-4 located away from the drain pipe were dry. Results are listed in the attached Table 1.

3. **Expose inlet of storm drain on freeway side of Boyd Road, measure direction of pipe, collect storm water samples from pipe if available.**

Results: A machete was used to cut away berry vines to allow access to the pipe inlet. No water was observed in the pipe or inlet area. The bearing of the first section of the pipe is 345°, approximately perpendicular to the direction of overlying Boyd Road. The fence line that is reportedly parallel to the Dutra-installed pipe bears 005° indicating a 20° bend in the pipe between Boyd Road and the Dutra property.

Summary

Verhey predicted that perched groundwater would drain from the soils in the former UST excavation and from wells MW-2, MW-3, and MW-5 during a period of dry weather, provided that no additional water was introduced. As water was found in the three monitoring wells nearest the drainage pipe, it can be concluded that additional source water is being introduced into the subsurface in the vicinity of the former UST excavation and wells MW-2, MW-3, and MW-5.

The water depth measured in the production well was 30.29 feet and is likely representative of groundwater depth at most parts of the former Dutra property during dry periods. Why water should be present in MW-2, MW-3, and MW-5 at depths of 14.29 feet, 12.40 feet, and 18.25 feet, respectively remains an open question. No water was observed in the drain pipe on July 5, 2005, at the time of well gauging.

From a meeting with Frank Dutra, the route and purpose of the drain pipe is known and the location of the former fuel dispensers is known.

Recommendations

1. Investigate further the source of water to the former UST excavation and MW-2, MW-3, and MW-5. Inquire about locations of sanitary sewer, septic systems, water distribution pipes, and other possible sources of water to the subsurface.

2. Sample water in Caltrans culvert inlet at Boyd Road when surface water is available and analyze for gasoline and diesel range hydrocarbons.

3. Use borings, trenches, or wells to evaluate leakage from drainage pipe and possible upgradient contaminant sources. Design specifics for additional subsurface investigation work will be forthcoming as project requirements dictate.

4. Install deeper monitoring wells down gradient from former UST excavation. Design specifics for additional subsurface investigation work will be forthcoming as project requirements dictate.

If you have any questions or comments, please do not hesitate to call.

Sincerely,
WINZLER & KELLY

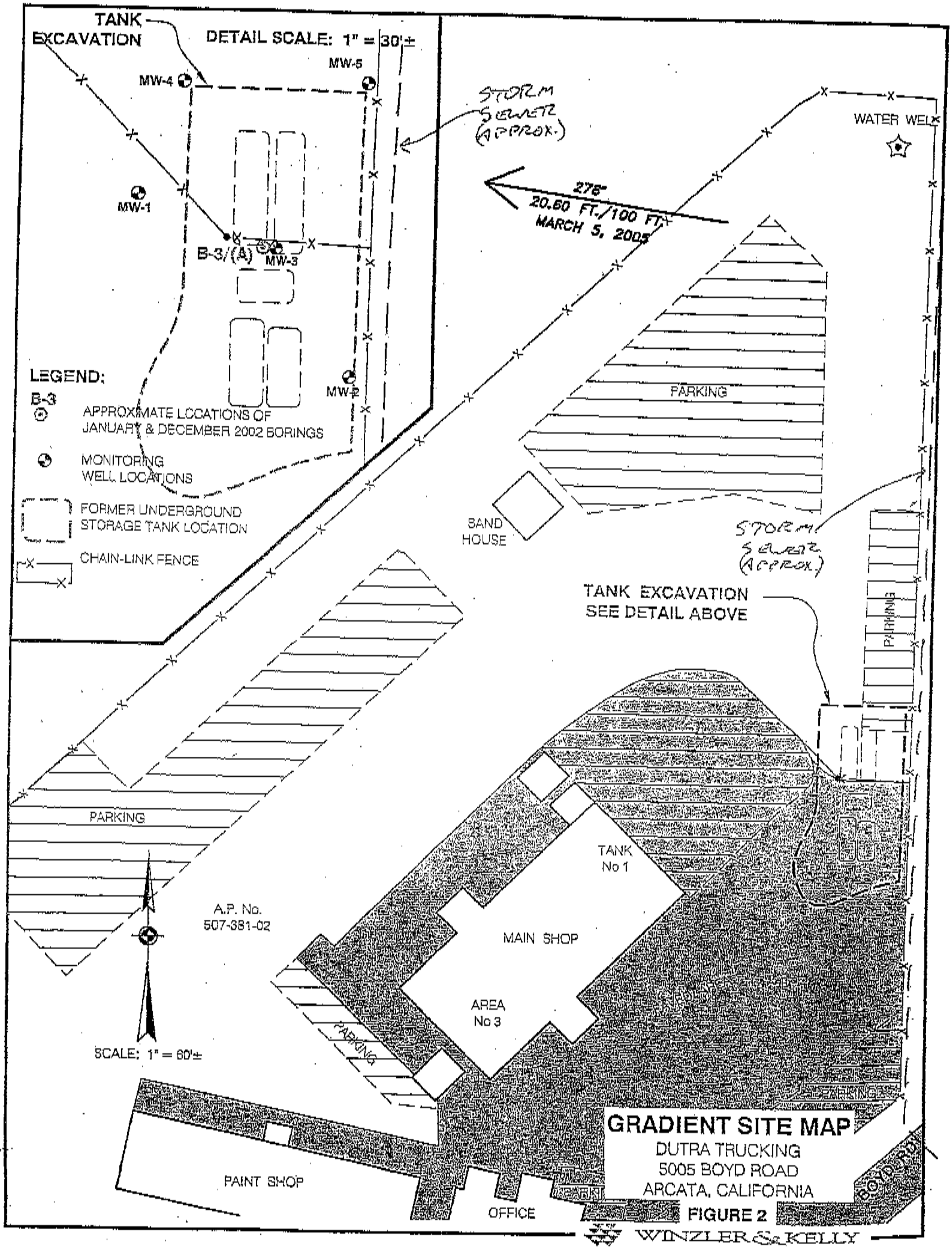
Kenneth Thiessen, CEG #2224
Certified Engineering Geologist

CERTIFIED ENGINEERING GEOLOGIST
KENNETH R. THIESSEN
No. 2224
Exp. 10/31/06
STATE OF CALIFORNIA

tp

Attachments: Tables and Figures
Figure 1 Site Map
Table 1 Groundwater Level Measurements

c: Mr. Frank Dutra
P.O. Box 898
Willow Creek, California 95573



TANK EXCAVATION
DETAIL SCALE: 1" = 30'±
MW-4
MW-5
MW-1
B-3/(A)
MW-3
MW-2
STORM SEWER (APPROX.)
LEGEND:
B-3
APPROXIMATE LOCATIONS OF JANUARY & DECEMBER 2002 BORINGS
MONITORING WELL LOCATIONS
FORMER UNDERGROUND STORAGE TANK LOCATION
CHAIN-LINK FENCE
WATER WELL
276°
20.60 FT./100 FT.
MARCH 5, 2005
PARKING
SAND HOUSE
STORM SEWER (APPROX.)
TANK EXCAVATION SEE DETAIL ABOVE
PARKING
PARKING
A.P. No. 507-381-02
TANK No 1
MAIN SHOP
AREA No 3
PARKING
SCALE: 1" = 60'±
PAINT SHOP
OFFICE
PARKING
BOYD RD.
GRADIENT SITE MAP
DUTRA TRUCKING
5005 BOYD ROAD
ARCATA, CALIFORNIA
FIGURE 2
WINZLER & KELLY

TABLE 1
GROUNDWATER LEVEL MEASUREMENTS
Former Dutra Trucking, LOP #12264

Well Number	Date	Groundwater Elevation (ft)	Top of Casing (ft)	A Depth to Water (ft)	B Depth to Product (ft)	(A-B=C) Product Thickness (ft)	D Correction Factor (C x 0.729*)	A-D Equivalent Depth to Water (ft)
MW-1	4-Feb-04	33.48	48.03	14.55	0.00	0.00	0.00	14.55
	3-May-04	DRY	48.03	DRY	DRY	DRY	DRY	DRY
	30-Nov-04	DRY	48.03	DRY	DRY	DRY	DRY	DRY
	4-Mar-05	DRY	48.03	DRY	DRY	DRY	DRY	DRY
	5-Jul-05	DRY	48.03	DRY	DRY	DRY	DRY	DRY
MW-2	4-Feb-04	39.94	47.49	7.55	0.00	0.00	0.00	7.55
	3-May-04	34.49	47.49	13.00	0.00	0.00	0.00	13.00
	30-Nov-04	33.96	47.49	13.53	0.00	0.00	0.00	13.53
	4-Mar-05	39.83	47.49	7.66	0.00	0.00	0.00	7.66
	5-Jul-05	33.20	47.49	14.29	0.00	0.00	0.00	14.29
MW-3	4-Feb-04	37.49	47.80	10.31	0.00	0.00	0.00	10.31
	3-May-04	35.35	47.80	12.45	0.00	0.00	0.00	12.45
	30-Nov-04	33.39	47.80	14.41	0.00	0.00	0.00	14.41
	4-Mar-05	36.05	47.80	11.75	0.00	0.00	0.00	11.75
	5-Jul-05	35.40	47.80	12.40	0.00	0.00	0.00	12.40
MW-4	4-Feb-04	DRY	48.54	DRY	DRY	DRY	DRY	DRY
	3-May-04	DRY	48.54	DRY	DRY	DRY	DRY	DRY
	30-Nov-04	DRY	48.54	DRY	DRY	DRY	DRY	DRY
	4-Mar-05	DRY	48.54	DRY	DRY	DRY	DRY	DRY
	5-Jul-05	DRY	48.54	DRY	DRY	DRY	DRY	DRY
MW-5	4-Feb-04	40.06	48.62	8.56	0.00	0.00	0.00	8.56
	3-May-04	30.17	48.62	18.45	0.00	0.00	0.00	18.45
	30-Nov-04	DRY	48.62	DRY	DRY	DRY	DRY	DRY
	4-Mar-05	38.52	48.62	10.10	0.00	0.00	0.00	10.10
	5-Jul-05	30.37	48.62	18.25	0.00	0.00	0.00	18.25

*0.729 is the density of gasoline at 15oC as referenced in the API Publication 1628, Second Edition, August, 1989
NA Not applicable

Appendix B
Figures

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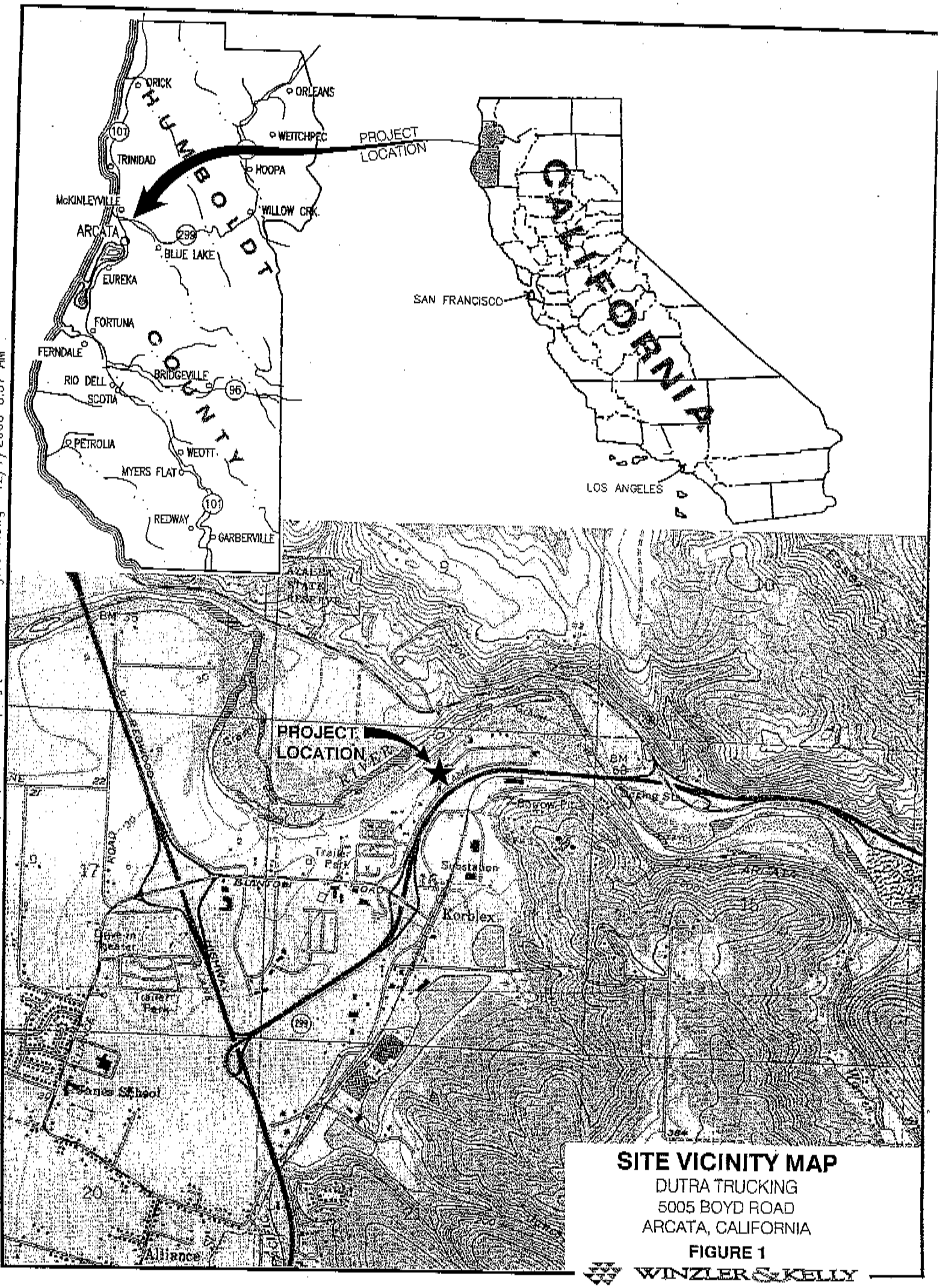
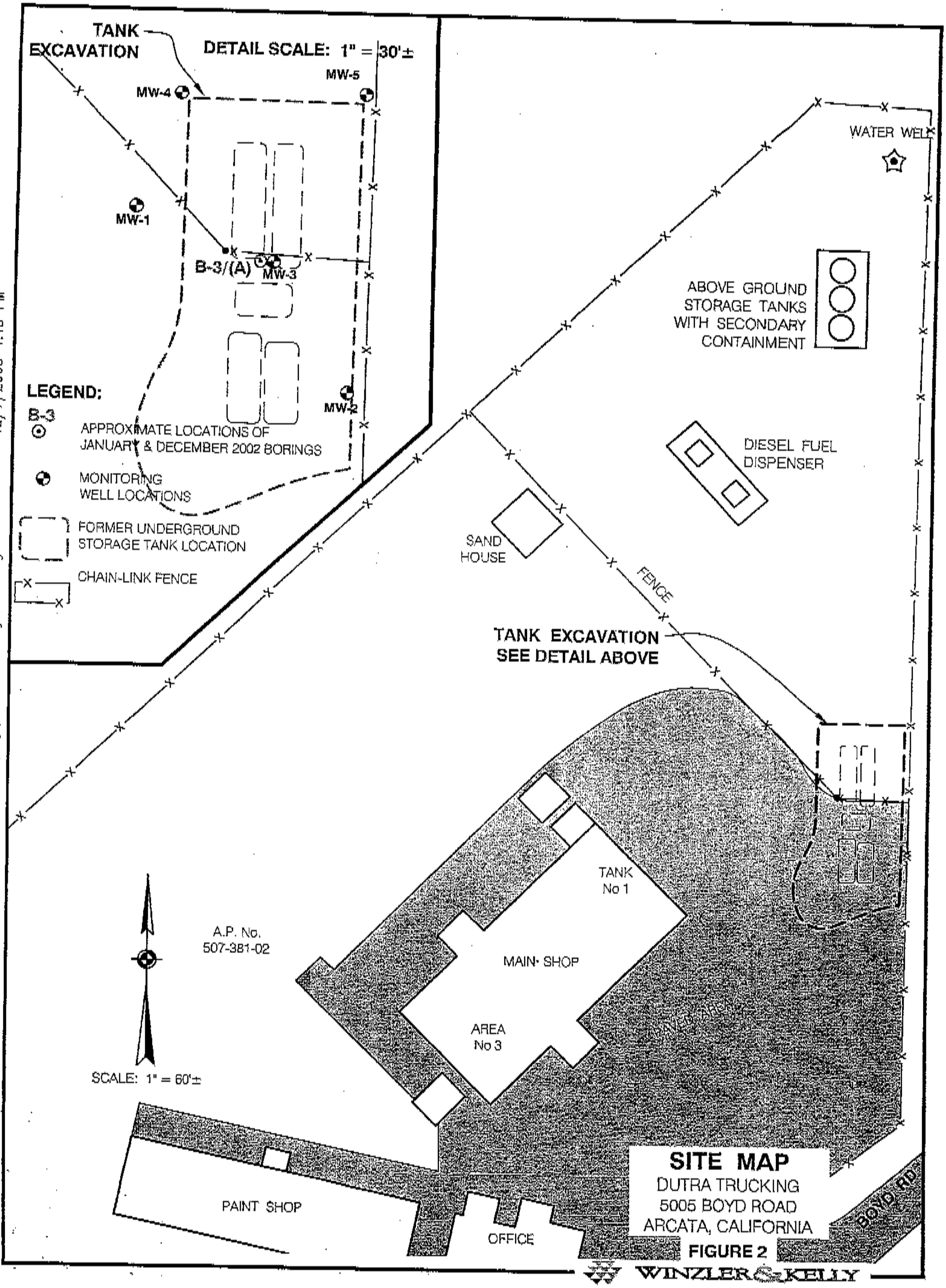


SITE VICINITY MAP

DUTRA TRUCKING
5005 BOYD ROAD
ARCATA, CALIFORNIA

FIGURE 1

WINZLER & KELLY



SITE MAP
DUTRA TRUCKING
5005 BOYD ROAD
ARCATA, CALIFORNIA
FIGURE 2

WINZLER & KELLY

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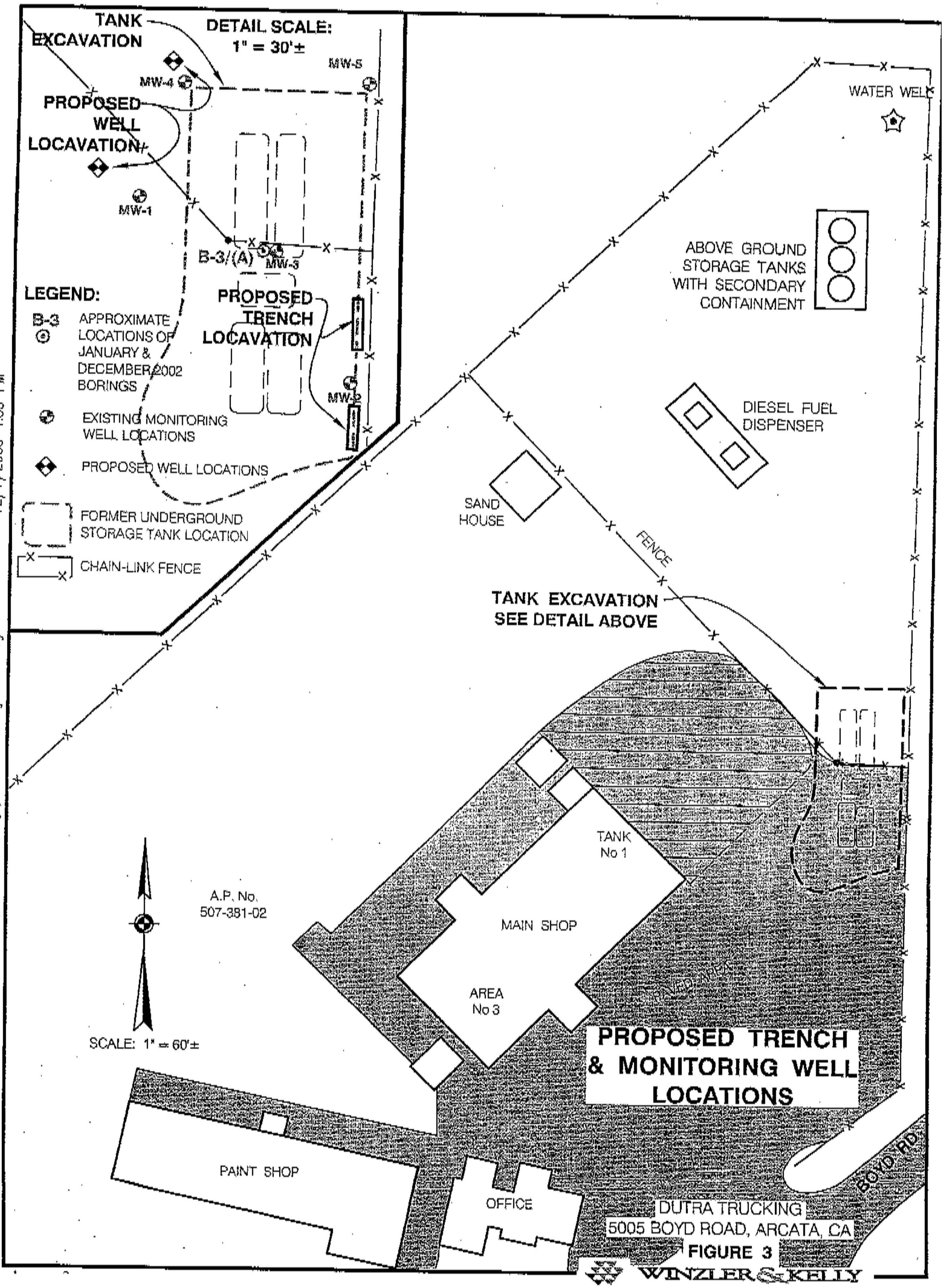

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Appendix C
Tables

Groundwater Gradient Data
Former Dutra Trucking, LOP #12264

Date	Gradient Direction (degrees Azimuth)	Gradient Magnitude (ft./100 ft.)
1/29/2002 *	Northwest (293.5)	10.3
2/04/2004 **	West (271)	12.53
5/03/2004 **	Northeast (71)	16
11/30/2004****	Insufficient data	Insufficient data
3/4/2005**	West (278)	20.6

* Gradient direction and magnitude based upon gage data from soil borings; not a product of survey.
** Gradient direction and magnitude based upon permanent monitoring well locations and survey information.
**** Gradient direction and magnitude could not be calculated due to lack of water in three of the five wells.

SOIL ANALYTICAL RESULTS
Former Dutra Trucking, LOP #12264

(All units reported in parts per million)

Sample ID	Sample Date	Base Sample Depth (feet)	TPH as Diesel (ppm)	TPH as Motor Oil (ppm)	TPH as Gasoline (ppm)	Benzene (ppm)	Toluene (ppm)	Ethyl-benzene (ppm)	Total Xylenes (ppm)	(MTBE) Methyl Tertiary Butyl Ether (ppm)	(DIPE) Di-Isopropyl Ether (ppm)	(ETBE) Ethyl Tertiary Butyl Ether (ppm)	(TAME) Tertiary Amyl Methyl Ether (ppm)	(TBA) Tertiary Butyl Alcohol (ppm)	(1,2 DCB) 1,2-Dichloro benzene (ppm)	(1,3 DCB) 1,3-Dichloro benzene (ppm)	(1,4 DCB) 1,4-Dichloro benzene (ppm)	(1,2 DCA) 1,2-Dichloro ethane (ppm)	(EDB) 1,2-Dibromo methane (ppm)	Chloro benzene (ppm)
UNDERGROUND STORAGE TANK REMOVAL																				
#1	15-May-90	Not Avail.	5	NA	<1	<0.05	<0.05	<0.05	<0.05	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
#2	15-May-90	Not Avail.	NA	NA	<1	<0.05	<0.05	<0.05	<0.05	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
#3	15-May-90	Not Avail.	3.8	NA	<1	<0.05	<0.05	<0.05	<0.05	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
#4	15-May-90	Not Avail.	4.9	NA	NA	<0.05	<0.05	<0.05	<0.05	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
#5	15-May-90	Not Avail.	2.8	NA	NA	<0.05	<0.05	<0.05	<0.05	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
#6	15-May-90	Not Avail.	2.3	NA	NA	<0.05	<0.05	<0.05	<0.05	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
#7	15-May-90	Not Avail.	5.3	NA	NA	<0.05	<0.05	<0.05	<0.05	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
#8	15-May-90	Not Avail.	2	NA	NA	<0.05	<0.05	<0.05	<0.05	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
#21	23-May-90	21	1.5	NA	NA	<0.05	<0.05	<0.05	<0.05	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
INITIAL SUBSURFACE INVESTIGATION																				
B1-6	28-Jan-02	6.0	<1.0	<10	<1.0	<0.0050	<0.0050	<0.0050	<0.015	<0.025	<0.020	<0.020	<0.020	<0.50	<0.0050	<0.0050	<0.0050	<0.020	<0.020	<0.0050
B1-11	28-Jan-02	11.0	<1.0	<10	<1.0	<0.0050	<0.0050	<0.0050	<0.015	<0.025	<0.020	<0.020	<0.020	<0.50	<0.0050	<0.0050	<0.0050	<0.020	<0.020	<0.0050
B2-11	28-Jan-02	11.0	<1.0	<10	<1.0	<0.0050	<0.0050	<0.0050	<0.015	<0.025	<0.020	<0.020	<0.020	<0.50	<0.0050	<0.0050	<0.0050	<0.020	<0.020	<0.0050
B3-11.5	28-Jan-02	11.5	320	160	67	<0.0050	<0.0050	<0.0050	<0.015	<0.025	<0.020	<0.020	<0.020	<0.50	<0.0050	<0.0050	<0.0050	<0.020	<0.020	<0.0050
B4-11	28-Jan-02	11.0	<1.0	<10	<1.0	<0.0050	<0.0050	<0.0050	<0.015	<0.025	<0.020	<0.020	<0.020	<0.50	<0.0050	<0.0050	<0.0050	<0.020	<0.020	<0.0050
B5-10.5	28-Jan-02	10.5	<1.0	<10	<1.0	<0.0050	<0.0050	<0.0050	<0.015	<0.025	<0.020	<0.020	<0.020	<0.50	<0.0050	<0.0050	<0.0050	<0.020	<0.020	<0.0050

<X analyte not detected at, or above the detection limit of X.
NA Not analyzed
NS Not Sampled

Winzler Kelly
Consulting Engineers

GROUNDWATER ANALYTICAL RESULTS
Former Dutra Trucking, LOP #12264

(All units reported in parts per billion)

Sample ID	Sample Date	TPH as Diesel (ppb)	TPH as Motor Oil (ppb)	TPH as Gasoline (ppb)	Benzene (ppb)	Toluene (ppb)	Ethyl-benzene (ppb)	Total Xylenes (ppb)	(MTBE) Methyl Tertiary Butyl Ether (ppb)	(DIPE) Di-isopropyl Ether (ppb)	(ETBE) Ethyl Tertiary Butyl Ether (ppb)	(TAME) Tertiary Amyl Methyl Ether (ppb)	(TBA) Tertiary Butyl Alcohol (ppb)	(1,2 DCB) 1,2-Dichloro benzene (ppb)	(1,3 DCB) 1,3-Dichloro benzene (ppb)	(1,4 DCB) 1,4-Dichloro benzene (ppb)	(1,2 DCA) 1,2-Dichloro ethane (ppb)	(EDB) 1,2-Dibromo methane (ppb)	Chloro-benzene (ppb)
SUBSURFACE INVESTIGATION JAN. & DEC. 2002																			
B1	28-Jan-02	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
B2	28-Jan-02	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
B3	28-Jan-02	180	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
B4	29-Jan-02	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
B6	29-Jan-02	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Domestic Well	29-Jan-02	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
B3	30-Dec-02	21,000	6,500	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
HYDROGEOLOGIC INVESTIGATION, FEB. 2004 MONITORING EVENT																			
MW-1	4-Feb-04	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	NA	NA	NA	NA	NA	NA
MW-2	4-Feb-04	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	NA	NA	NA	NA	NA	NA
MW-3	4-Feb-04	320	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	NA	NA	NA	NA	NA	NA
MW-4	4-Feb-04	DRY																	
MW-5	4-Feb-04	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	NA	NA	NA	NA	NA	NA
MAY 2004 GROUNDWATER MONITORING EVENT																			
MW-1	3-May-04	DRY																	
MW-2	3-May-04	ND	NA	NA	ND	ND	ND	ND	ND	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
MW-3	3-May-04	850	NA	NA	ND	ND	ND	ND	ND	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
MW-4	3-May-04	DRY																	
MW-5	3-May-04	ND	NA	NA	ND	ND	ND	ND	ND	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
NOVEMBER 2004 GROUNDWATER MONITORING EVENT																			
MW-1	30-Nov-04	DRY																	
MW-2	30-Nov-04	ND	NA	NA	ND	ND	ND	ND	ND	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
MW-3	30-Nov-04	9,800	NA	NA	ND	ND	ND	ND	ND	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
MW-4	30-Nov-04	DRY																	
MW-5	30-Nov-04	DRY																	
MARCH 2005 GROUNDWATER MONITORING EVENT																			
MW-1	4-Mar-05	DRY																	
MW-2	4-Mar-05	640	NA	NA	ND	ND	ND	ND	ND	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
MW-3	4-Mar-05	170	NA	NA	ND	ND	ND	ND	ND	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
MW-4	4-Mar-05	DRY																	
MW-5	4-Mar-05	ND	NA	NA	ND	ND	ND	ND	ND	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA

ND: Not Detected
NA: Not Analyzed
DRY: no water in well

GROUNDWATER LEVEL MEASUREMENTS
Former Dutra Trucking, LOP #12264

Well Number	Date	Groundwater Elevation (ft)	Top of Casing (ft)	A Depth to Water (ft)	B Depth to Product (ft)	(A-B=C) Product Thickness (ft)	D Correction Factor (C x 0.729*)	A-D Equivalent Depth to Water (ft)
MW-1	4-Feb-04	33.48	48.03	14.55	0.00	0.00	0.00	14.55
	3-May-04	DRY	48.03	DRY	DRY	DRY	DRY	DRY
	30-Nov-04	DRY	48.03	DRY	DRY	DRY	DRY	DRY
	4-Mar-05	DRY	48.03	DRY	DRY	DRY	DRY	DRY
	5-Jul-05	DRY	48.03	DRY	DRY	DRY	DRY	DRY
MW-2	4-Feb-04	39.94	47.49	7.55	0.00	0.00	0.00	7.55
	3-May-04	34.49	47.49	13.00	0.00	0.00	0.00	13.00
	30-Nov-04	33.96	47.49	13.53	0.00	0.00	0.00	13.53
	4-Mar-05	39.83	47.49	7.66	0.00	0.00	0.00	7.66
	5-Jul-05	33.20	47.49	14.29	0.00	0.00	0.00	14.29
MW-3	4-Feb-04	37.49	47.80	10.31	0.00	0.00	0.00	10.31
	3-May-04	35.35	47.80	12.45	0.00	0.00	0.00	12.45
	30-Nov-04	33.39	47.80	14.41	0.00	0.00	0.00	14.41
	4-Mar-05	36.05	47.80	11.75	0.00	0.00	0.00	11.75
	5-Jul-05	35.40	47.80	12.40	0.00	0.00	0.00	12.40
MW-4	4-Feb-04	DRY	48.54	DRY	DRY	DRY	DRY	DRY
	3-May-04	DRY	48.54	DRY	DRY	DRY	DRY	DRY
	30-Nov-04	DRY	48.54	DRY	DRY	DRY	DRY	DRY
	4-Mar-05	DRY	48.54	DRY	DRY	DRY	DRY	DRY
	5-Jul-05	DRY	48.54	DRY	DRY	DRY	DRY	DRY
MW-5	4-Feb-04	40.06	48.62	8.56	0.00	0.00	0.00	8.56
	3-May-04	30.17	48.62	18.45	0.00	0.00	0.00	18.45
	30-Nov-04	DRY	48.62	DRY	DRY	DRY	DRY	DRY
	4-Mar-05	38.52	48.62	10.10	0.00	0.00	0.00	10.10
	5-Jul-05	30.37	48.62	18.25	0.00	0.00	0.00	18.25

*0.729 is the density of gasoline at 15oC as referenced in the API Publication 1628, Second Edition, August, 1989
NA Not applicable

Appendix D
Winzler & Kelly Standard Operating Procedures (SOPs)

WINZLER & KELLY, CONSULTING ENGINEERS

STANDARD OPERATING PROCEDURES
for
MONITORING WELL INSTALLATION AND DEVELOPMENT

SECTION I. MONITORING WELL INSTALLATION

1. Objective

To establish accepted procedures for the installation of monitoring wells for sites under investigation or remediation from impacts with chemical contaminants.

2. Background

Monitoring wells are used for subsurface investigation and remediation projects. Well-designed monitoring wells provide data on groundwater movement, groundwater quality, seasonal water table fluctuations, rates of natural attenuation, and changes in contaminant concentrations through time. Monitoring wells are installed in accordance with the California Well Standards (Department of Water Resources Bulletin 74-90) and with the appropriate lead agency guidelines.

3. Personnel Utilized and Responsibilities

Registered Professional: A Registered Professional (RP) is responsible for ensuring that the monitoring wells are properly installed, that the possibility of cross contamination between aquifers has been minimized, and that the well installation will achieve its desired purpose. The RP oversees the project and ensures that field personnel have been trained in the use of this procedure.

Project Scientist: The responsible professional in charge of fieldwork must determine the location and depth of each well, and decide on the sampling interval. The project scientist oversees installation of the well, collects samples and prepares them for transport to the laboratory, and records lithologic and other observations. The Project Scientist is responsible for site safety and health and compliance with this SOP and for submittal of the well completion report to the Department of Water Resources.

Staff Technician: A staff technician has 0.5 to 5 years experience logging borings, installing and developing monitoring wells. The staff technician is responsible for complying with these procedures, lithologic logging, collection of samples, and field documentation, and development of wells prior to sampling. The staff technician will call the RP with field observations and contaminant data to obtain approval of final well design.

Driller (Subcontractor): An appropriately licensed (C57) drilling contractor must employ an OSHA-certified crew. The Driller is responsible for the safety and conduct of their employees and complying with the project specifications described in the Workplan and contract. All drilling and sampling methods will be consistent with ASTM Method D-1452-80, and local, state, and federal regulations. The Driller is responsible for installing monitoring wells according to pertinent agency standards.

4. Equipment Required

- Well Installation permit, Access Agreements, and other permits as needed
- Copy of approved Workplan with site Safety Plan included
- Minimum Level D personal protective equipment
- Downhole sampler with brass or stainless steel liners, Teflon sheeting, and end caps
- Photoionization detector (PID) / sealable plastic storage bags
- Boring Log form / Munsell color charts / USCS soil classification system chart
- Sample containers - provided by the laboratory OR
- EnCore® Sampling kit and soil cartridge containers
- Sample labels/Indelible marker/Chain of Custody forms
- Disposable gloves
- Ice chest with ice

5. Procedure

Winzler & Kelly will obtain all permits to perform drilling work unless contractually directed otherwise. Winzler & Kelly will prepare a site Safety and Health Plan detailing project hazards and controls, personnel decontamination, and emergency response procedures.

At least 48 hours before drilling, Winzler & Kelly personnel will contact Underground Services Alert (USA), or similar utility location service, to have subsurface utilities located and marked within the work area previously delineated with white paint. In order to ensure that the locations of subsurface utilities are known, Winzler & Kelly may perform a site inspection, contact individuals familiar with the work site, review as-built drawings, and may employ a private utility locator. When subsurface utilities are suspected, the first five feet of each boring will be advanced using a hand auger or posthole digger.

All monitoring wells are installed using a truck-mounted hollow-stem auger drill rig, unless site conditions require a different drilling method. All drilling equipment will be maintained and inspected daily. A drill rig kill switch mechanism will be operational and within reach of anyone working near the drill.

All down-hole drilling equipment will be cleaned and decontaminated prior to arriving at the site. Working components of the drill rig, drill stems, and augers are steam cleaned between monitoring well locations.

When ever possible, the first boring will be sampled to provide a continuous core to obtain a complete lithologic section of the boring. In subsequent borings, soil samples will be collected at approximately five-foot intervals to the total depth explored. Soil samples may also be collected from differing lithologies or areas of obvious contamination. Samples will be collected using a California-modified split spoon sampler driven 18 to 24 inches into native material beyond the auger bit. The split spoon will be driven using a 140-pound hammer dropped from 30 inches. The number of blow counts required to drive the sampler each six-inch interval and the volume of soil recovered will be recorded on the well log. If copper or zinc contamination is being investigated, stainless steel liners will be used in lieu of brass.

Metal soil sample tubes selected for laboratory analysis will be covered on both ends with Teflon tape and sealed with plastic end caps. Samples will be labeled, recorded using Chain of Custody documentation, and placed into a chilled cooler for transport to the analytical laboratory. Soil in the remaining tubes will be retained for lithologic description and organic vapor analysis. Headspace organic vapor analysis will be accomplished by placing a hand sample of soil into a sealable plastic bag and allowing the sample to rise to ambient temperature. The probe of the PID will used to penetrate the bag to sample the headspace. The peak organic vapor reading is recorded on the well log.

Classify soil types and log observations using the Unified Soil Classification System (ASTM Visual Manual Procedure D 2488-84) and Munsell Soil Color Charts. Include observations on lithology, moisture, density, plasticity, and sample depths on the boring logs as appropriate.

An aquitard or aquiclude (clayey layer), three feet in thickness or greater, encountered beneath a saturated permeable layer, should be considered to be a possible confining layer to deeper aquifers. In order to prevent possible cross-contamination of a deeper aquifer, drilling will be stopped and the project manager or geologist consulted to determine how to proceed.

Soil drill cuttings are stockpiled on plastic and covered with additional plastic to control runoff or stored in 55-gallon DOT approved drums and left on site. Waste soil is sampled and analyzed to prepare a profile necessary for disposal and hauled by a licensed transporter to an appropriate licensed facility. All waste stored on site is labeled at the time of production.

6. Well Design and Construction

All well construction is performed in accordance with Department of Water Resources "California Well Standards" and all requirements of local oversight agencies. Borings for two inch monitoring wells will be a minimum of 8 inches in diameter and a minimum of 10 inches in diameter for four-inch wells. Monitoring wells are constructed of schedule 40 PVC casing unless site geochemistry or contaminant types dictate use of another material. The wells are constructed with factory-cut slots and threaded coupling between casing sections and caps.

The screened portion of the well is positioned so that it extends approximately ten feet into the water-bearing zone and approximately five feet above the maximum expected water elevation. The screened interval may extend less than five feet above the maximum water level to prevent intersection of well screen with the confining layer at the top of a confined aquifer, or where the water table is too shallow to allow for adequate construction of the well seal. Careful consideration should be given to the specific gravity of the contaminants of concern and screening the upper or lower portion of the aquifer.

A graded sand filter pack is placed in the annular space across the screened interval and extended at least one foot above the screen. This additional sand helps to prevent bentonite hole plug from entering the well screen if compaction of the filter pack occurs. The well screen slot size should be capable of retaining 90% of the filter pack material. Typically, 0.010-inch slots are used where the aquifer material is predominantly clay and /or silt or poorly graded fine sand. A slot size of 0.020 inch is used when the water bearing formation is well-graded medium to coarse sand and/or gravel.

The silica sand filter pack grain size is selected according to aquifer material type as follows:

- For poorly graded fine sand or silt and clay – four times the 70% retained grain size of the formation;
- For medium to coarse sand, gavel or well-graded sediments – six times the 70% retained grain size.

Since results of particle size sieve analysis may not be available, filter pack selection may be performed on the basis of stratigraphy, using the finest grain size unit to be encountered in the screened interval as the defining particle size. Commonly selected grades of filter sand are 1/20 (or equivalent) for use with 0.010 inch slots and 2/12 or 2/16 (or equivalent) for use with 0.020 inch slotted screens.

The filter pack should be added slowly to fill the annular space between the well screen and the sides of the boring. The filter pack sand can be emplaced either through the hollow stem of the auger as the auger is removed or in the open hole surrounding the well casing if soil conditions permit. Uniform placement of the filter pack must be monitored during placement to ensure that bridging, or formation of an air gap, does not occur. The placement of the filter pack is monitored using a weighted tape measure to gauge the rate of filter sand placement and break any bridges. A bridged filter pack will eventually collapse and possibly result in failure of the bentonite well seal and impair the well surface seal.

A minimum two-foot seal of bentonite is placed above the sand filter pack. The bentonite seal is hydrated by either formation or potable water. Neat cement or a cement/bentonite mixture seals the remaining annular space to the surface. If bentonite is used in the grout mixture, it must not exceed 5% of the mixture, by weight. The grout may be placed using a tremie pipe, if the grout column will be longer than 20 feet or if water is present in the annular space above the bentonite seal.

A watertight locking cap and protective traffic-rated vault is installed on top of each well. The traffic-rated vault will be set in concrete and be raised slightly above the surrounding grade to ensure that rainwater or other drainage water does not pool over the wells.

Well construction details are presented on the soil boring log sheet for each well. Waterproof tags are attached to each well casing to provide data on well identification, installation date, and as-built construction details. Winzler & Kelly completes and submits or determines that adequate information has been provided to the Driller for him to complete and submit the required Well Completion Report to the Department of Water Resources.

The last page of this SOP illustrates a Typical Monitoring Well Construction Detail.

To make well data suitable for inclusion in the State of California GeoTracker GIS network, well location data must be surveyed horizontally to within than one meter accuracy using latitude/longitude coordinates and surveyed vertically to within 0.01 foot relative to mean sea level.

SECTION II. MONITORING WELL DEVELOPMENT

1. Objective

To establish accepted procedures for conducting well development prior to purging and sampling activities in accordance with standard practices by engineering professionals.

2. Background

Following the installation of a monitoring well, it is necessary to develop the well in order to adequately remove the silt and clay (fines) from the filter pack material and in the immediate proximity of the well, in order to minimize the infiltration of fines throughout the life of the monitoring well.

3. Personnel Required and Responsibilities

Project Manager: The Project Manager (PM) is responsible for ensuring that field personnel have been trained in the use of these procedures and for verifying that the development procedures are performed in compliance with this SOP. At a minimum, the PM will maintain contact with the client or contractor involved, will be available by phone during the field activities and will review field notes for completeness.

Field Geologist/Field Engineer/Soil Scientist/Technician: The field staff person assigned to the project is responsible for complying with this SOP. Responsibilities include preparation for field activities, ensuring equipment is in working order and clean prior to the field event, providing adequate field documentation of events, observations, readings, measurements, volume of water, and overall development activities.

4. Equipment Required

- Tool Box
- Disposable gloves
- Decontamination supplies
- Water Level Meter/tape and paste/other device
- Measuring tape
- Indelible marker/Drum labels
- Surge Block
- Development pump and hoses OR bailers and line
- Several 5-gallon buckets with 1 gallon increments noted
- 55-gallon drums or other water storage facility
- Well Development Forms

5. Procedure

After completion of monitoring well installation, and no sooner than 48 hours following emplacement of the well seals, the well shall be developed as described below. Prior to insertion in any well, all equipment will either be decontaminated or will be deemed clean, or previously unused, by the manufacturer.

- Open all monitoring wells at the site and allow to equilibrate approximately 15 minutes. Denote time and visual observations regarding well access, condition, security, etc. in logbook.
- Obtain initial depth to groundwater level readings from the point of survey mark, or from the North side of the top of the PVC casing, if not point of survey mark is

present. Readings will be measured to the nearest 0.01 foot. Denote time and readings in logbook and on forms provided.

- Obtain depth to casing bottom for each well. Readings will be measured to the nearest 0.01 foot. Denote readings in logbook, and compare with boring log information.
- Calculate the volume of standing water in each monitoring well. Denote the volume calculated for each well in logbook and/or on forms provided.
- Alternate surging/swabbing of the screened interval and purging of the water:
  - Surging/Swabbing: Using either a surge block, the purge pump, or a heavy bailer, swab the screened portion of the well by lowering the surge equipment to the bottom of the well, rapidly raising and lowering the equipment in 2-foot intervals in a plunger-like fashion. This should force water in and out of the screened interval. Repeat the surge/swab at least 10 times at each 2-foot interval. Then swab the next two-foot screened interval. Follow each round of surging by purging.
  - Purging: Following each round of surging of the screened interval, the well shall be purged of water. Be sure to lower the bailer to the bottom of the well in order to "grab" the silts and clays which have settled to the bottom of the well. If a well has a large portion of fines, then the purging may be performed only using a bailer, since silts and clays can cause malfunction in the pumps.
- **Please note, to develop the entire screened interval, water must be present over the entire length of screen. In wells with little water or with very poor recharge, distilled water may be added to the well to ensure adequate development of the well. If water is added, the volume of water added must be documented, and the water being used should be sampled for the presence of contaminants.**
- Continue the process until the entire screened interval has been adequately swabbed and purge water is relatively clear of fine material.
- Contain all purge water in the drums or other containers provided. Denote the date, time and origin of the water on the containers. Include calculation of the volume of water removed from each well and observations of the presence of sediments and color/odor of water, etc., in the logbook and on the forms provided.
- Obtain final depth to groundwater level readings from the point of survey mark, or from the North side of the top of the PVC casing, if not point of survey mark is present. Readings will be measured to the nearest 0.01 foot. Denote time and readings in logbook and on forms provided.
- Conduct final decontamination procedures of any field equipment that is not disposable.
- Close and secure each well upon completion of field activities. Ensure that all water storage containers are closed and secured and that the site is clean.

WINZLER & KELLY, CONSULTING ENGINEERS

STANDARD OPERATING PROCEDURES
for
SOIL SAMPLING FROM AN EXCAVATION

1. Objective

To establish accepted procedures for conducting soil sampling activities from an excavation in accordance with standard practices by engineering professionals.

2. Background

Following removal of an underground storage tank, or over-excavation of apparently contaminated soil from an excavation, confirmation sampling is performed. The confirmation sampling may consist of soil sampling or soil and water sampling. (Refer to the Winzler & Kelly SOP for Water Sampling From an Excavation). Additionally, sampling of the "stockpiled" soil may be performed.

Numerous state and local agencies have established criteria for the number and location of confirmation samples required. Prior to conducting the field activities, the requirements of the governing agency shall be investigated in order to ensure compliance.

3. Personnel Required and Responsibilities

Project Manager: The Project Manager (PM) is responsible for ensuring that field personnel have been trained in the use of these procedures and for verifying that the sampling procedures are performed in compliance with this SOP. At a minimum, the PM will maintain contact with the client or contractor involved, will ensure the proper number/locations of samples to be collected in accordance with the local governing agency, will be available by phone during the field activities and will review field notes for completeness.

Field Geologist/Soil Scientist/Technician: The field staff person assigned to the project is responsible for complying with this SOP. Responsibilities include preparation for field activities, ensuring equipment is in working order prior to the field event, providing adequate field documentation of events, observations, readings, measurements and sampling activities.

4. Equipment Required

- Organic Vapor Analyzer (PID or FID), calibrated and ready for use
- Disposable sampling gloves
- Decontamination supplies
- Soil sampling equipment (shovel, hand trowel, knife, etc.)
- Measuring tape
- Ziplock baggies
- Indelible marker
- Soil sampling containers and labels
- Chain-of-custody forms
- Ice chest and ice

- Camera with film
- Munsell Color Chart

5. Procedure

After the UST or the contaminated soil has been removed, the excavation is ready to be sampled. The field staff person shall perform the following activities, not necessarily in the order listed.

Soil Sampling Activities

If the excavation is less than 5 feet deep and the field staff person is comfortable with the site conditions, the excavation may be entered to obtain samples directly from the sidewalls/bottom. If the excavation is 5 feet or deeper, the field staff person will not enter the excavation without direction from a "competent person" and/or adequate shoring (pursuant with OSHA requirements).

- Soil shall be obtained from the desired location by means of the excavation equipment at the site (backhoe/excavator bucket) and brought to the ground surface for access.
- Near the teeth of the bucket, soil will be scraped away using a clean trowel or other device. A clean sample tube will be driven into the soil and filled completely to avoid air space. The sample tube will be retracted from the soil, capped with Teflon or aluminum sheeting and tight-fitting plastic caps.
- Each sample tube will be labeled with the a job number, sample identification, date and time of collection, sampler's name, and analyses required.
- Each sample will then be placed in a ziplock baggie, sealed, and stored in an ice chest (chilled to 4EC) until delivered to a state-certified laboratory under strict chain-of-custody documentation.
- A portion of the soil from the sample location will also be placed into a ziplock bag for lithologic logging and for field screening with an organic vapor analyzer (OVA).
- Once the soil in the baggie has been allowed to set for several minutes, the headspace of the baggie is screened for organic vapors with an OVA to document the presence or absence of vapors emitted from the soil. The OVA readings shall be documented on the field notes.
- If piping has been removed, the soil beneath the piping shall be sampled at a frequency of 1 per 20 lineal feet. The sampling shall be collected, described, screened, and documented in the same manner referenced above.

Stockpile Sampling Activities

- If a stockpile is to be sampled, the pile shall be measured and the approximate volume calculated.
- In general, one discrete soil sample per 20 cubic yards of soil shall be collected. If the pile is very large, composite sampling may be allowed at a frequency of one sample per 50 cubic yards or more. The actual sampling frequency will be site specific.
- Random sample locations within the stockpile should be sampled.
- The sampler shall dig a minimum of 18 inches into the stockpile prior to collecting a soil sample.
- A clean sample tube will then be driven into the soil pile until it is completely full.
- The sample handling, field screening and documentation as referenced for soil sampling above, will be followed.

General Site Activities

The field staff person shall:

- Describe the lithology observed on each sidewall and the bottom of the excavation, using the Unified Soils Classification System (USCS) and a Munsell Color Chart.
- Measure the length, width, and depth of the excavation and any notable features, with reference to permanent structures at the site
- Take photographs of the proceedings and of the site upon arrival, during activities, and upon departure, for additional documentation.
- Retain a copy of the chain-of-custody upon submittal of the samples to the laboratory, for documentation.
- Additional documentation shall include:
  - Measurements of the USTs removed (length, diameter)
  - Visual observations of the condition of the UST(s)
  - Disposition of waste generated
  - Name and association of all parties at the site during the activities
  - Other items deemed relevant

WINZLER & KELLY, CONSULTING ENGINEERS

STANDARD OPERATING PROCEDURES
for
MONITORING WELL DEVELOPMENT

1. Objective

To establish accepted procedures for conducting well development prior to purging and sampling activities in accordance with standard practices by engineering professionals.

2. Background

Following the installation of a monitoring well, it is necessary to develop the well in order to adequately remove the silt and clay (fines) from the filter pack material and in the immediate proximity of the well, in order to minimize the infiltration of fines throughout the life of the monitoring well.

3. Personnel Required and Responsibilities

Project Manager: The Project Manager (PM) is responsible for ensuring that field personnel have been trained in the use of these procedures and for verifying that the development procedures are performed in compliance with this SOP. At a minimum, the PM will maintain contact with the client or contractor involved, will be available by phone during the field activities and will review field notes for completeness.

Field Geologist/Field Engineer/Soil Scientist/Technician: The field staff person assigned to the project is responsible for complying with this SOP. Responsibilities include preparation for field activities, ensuring equipment is in working order and clean prior to the field event, providing adequate field documentation of events, observations, readings, measurements, volume of water, and overall development activities.

4. Equipment Required

- Tool Box
- Disposable gloves
- Decontamination supplies
- Water Level Meter/tape and paste/other device
- Measuring tape
- Indelible marker/Drum labels
- Surge Block
- Development pump and hoses OR bailers and line
- Several 5-gallon buckets with 1 gallon increments noted
- 55-gallon drums or other water storage facility
- Well Development Forms

5. Procedure

After completion of monitoring well installation, and no sooner than 48 hours following emplacement of the well seals, the well shall be developed as described below. Prior to insertion in any well, all equipment will either be decontaminated or will be deemed clean, or previously un-used, by the manufacturer.

- Open all monitoring wells at the site and allow to equilibrate approximately 15 minutes. Denote time and visual observations regarding well access, condition, security, etc. in log book.
- Obtain initial depth to groundwater level readings from the point of survey mark, or from the North side of the top of the PVC casing, if not point of survey mark is present. Readings will be measured to the nearest 0.01 foot. Denote time and readings in log book and on forms provided.
- Obtain depth to casing bottom for each well. Readings will be measured to the nearest 0.01 foot. Denote readings in log book, and compare with boring log information.
- Calculate the volume of standing water in each monitoring well. Denote the volume calculated for each well in log book and/or on forms provided.
- Alternate surging/swabbing of the screened interval and purging of the water:

– Surging/Swabbing: Using either a surge block, the purge pump, or a heavy bailer, swab the screened portion of the well by lowering the surge equipment to the bottom of the well, rapidly raising and lowering the equipment in 2-foot intervals in a plunger-like fashion. This should force water in and out of the screened interval. Repeat the surge/swab at least 10 times at each 2-foot interval. Then swab the next two-foot screened interval. Follow each round of surging by purging.

– Purging: Following each round of surging of the screened interval, the well shall be purged of water. Be sure to lower the bailer to the bottom of the well in order to "grab" the silts and clays which have settled to the bottom of the well. If a well has a large portion of fines, then the purging may be performed only using a bailer, since silts and clays can cause malfunction in the pumps.

- **Please note, to develop the entire screened interval, water must be present over the entire length of screen. In wells with little water or with very poor recharge, distilled water may be added to the well to ensure adequate development of the well. If water is added, the volume of water added must be documented, and the water being used should be sampled for the presence of contaminants.**
- Continue the process until the entire screened interval has been adequately swabbed and purge water is relatively clear of fine material.
- Contain all purge water in the drums or other containers provided. Denote the date, time and origin of the water on the containers. Include calculation of the volume of water removed from each well and observations of the presence of sediments and color/odor of water, etc., in the log book and on the forms provided.
- Obtain final depth to groundwater level readings from the point of survey mark, or from the North side of the top of the PVC casing, if not point of survey mark is present. Readings will be measured to the nearest 0.01 foot. Denote time and readings in log book and on forms provided.
- Conduct final decontamination procedures of any field equipment that is not disposable.
- Close and secure each well upon completion of field activities. Ensure that all water storage containers are closed and secured and that the site is clean.

WINZLER & KELLY, CONSULTING ENGINEERS

STANDARD OPERATING PROCEDURES
for
MONITOR WELL PURGING AND SAMPLING ACTIVITIES

1.0 Objective

To establish accepted procedures for the purging and sampling groundwater from monitoring wells, to ensure that representative samples of formation water are collected by accepted methods.

1.1 Background

To obtain a representative groundwater sample from monitor wells, it is necessary to remove (purge) stagnant water from within and near the well prior to sampling. In general, three to seven casing volumes must be removed from the well prior to sampling, to provide a representative sample. Wells may be sampled after purging less than the minimum three volumes if well recharge rates are beyond reasonable time constraints. The specific method of well purging will be decided on a case by case basis, or as required by project specifications.

1.2 Personnel Required and Responsibilities

Project Manager: The Project Manager (PM) is responsible for ensuring that field personnel have been trained in the use of these procedures and for verifying that monitoring well purging and sampling activities are performed in compliance with these SOP's.

Field Technician: The Field Technician is responsible for complying with these SOP's, including the purging and sampling of monitor wells, the safe containerization of extracted waters, the documentation of field procedures, and the handling of samples..

2.0 WELL PURGING ACTIVITIES

2.1 Equipment Required

- Bottom-filling bailer, suction air pump, air-lift pump, gas operated (bladder) pump, submersible pump, or other pumping device
- pH meter
- Conductivity/Temperature Meter
- Water Level Indicator
- Well Sampling Data Sheet
- Indelible marker
- Disposable gloves
- Containers to hold extracted water (as required)

2.2. Purging Procedure

Prior to groundwater sampling, each monitoring well will be purged as described below. Prior to insertion into each well, all equipment will be either decontaminated (following W&K Decontamination procedures) or will be deemed clean or previously unused by the manufacturer.

- Open all monitoring wells to be purged and allow to equilibrate 5 to 15 minutes. Record time and visual observations regarding well access, condition, security, etc. in log book.
- Obtain depth to groundwater level readings according to Winzler & Kelly Standard Operating Procedures for Groundwater Level measurements and Free Phase Hydrocarbon Measurements. Record time and readings on the Well Level Measurement Data Sheet.
- Calculate the volume of standing water in each monitoring well. Record the volume calculated for each well on the Well Sampling Data Sheet.
- Begin purging the well by removing water from the well and collecting in a calibrated container (i.e., 5-gallon bucket marked in 1-gallon increments). The depth, or interval, from which the water is being purged should be noted on the data sheet.
- Obtain readings of field parameters (pH, conductivity, temperature, and turbidity) and make visual observations of color/odor/turbidity at selected intervals (i.e., every gallon, every five gallons, etc.) throughout the purging process. Depending on the calculated volume and the expected number of gallons to be purged, a minimum of five readings should be collected. Record the time, readings, and visual comments on the Purge Data Sheet.
- Continue purging until at least three (minimum) to four well volumes have been removed and the field parameters stabilize to within:

pH	≈ 0.1
conductivity	$\approx 10\%$
turbidity	$\approx 10\%$
temperature	$\approx 1°$

  Do not exceed seven well volumes.
- Obtain a final depth to groundwater level measurement prior to collection of the groundwater sample and note the reading and time on the Well Level Measurement Data Sheet. Be sure that the measurement probe has been thoroughly decontaminated prior to insertion into each well. Note any qualitative comments regarding recharge rate of each well, and calculate the percent of the original water column that has recovered at the time of the final depth measurement. It is ideal to attain a minimum of 80% water level recovery prior to sampling, if time constraints allow. Very slow recharge rates may not allow purging the minimum three volumes or 80% recovery; lesser volumes may be used for sampling, as needed and documented.
- Collect a groundwater sample following the directions below under Section 3.0.
- Containerize all purge water and decontamination water in 55-gallon drums. Use yellow indelible markers (storeroom supply) to label all drums on the side with date, contents, origin and other pertinent information. Avoid marking the tops of drums with black marker, such marks are temporary and will soon fade/rust. Note the number, condition and location of drums on site in the field notes.

3.0 WELL SAMPLING ACTIVITIES

3.1 Equipment Required

- Disposable bailer (previously unused) *
- Bottom emptying device (sampling port)
- Monofilament nylon line (min 40-lb test)
- Monitor Well Purge & Sample Data Sheets
- Sample containers (preserved, as required) - provided by the laboratory
- Sample labels
- Indelible marker
- Disposal gloves
- Decontamination soap (Alconox)
- Distilled water for equipment decontamination.

* A variety of sampling techniques are available for the collection of groundwater samples. Except where otherwise required, W&K only utilizes disposable polyethylene bailers to collect groundwater samples.

3.2. Sampling Procedure

Prior to collecting a groundwater sample from a monitoring well, each well must be properly purged in accordance with W&K's SOP for Monitoring Well Purging Activities (See Section 2.0 above), including the measurement of the final water level and documentation of recharge.

- Water from the desired screen interval will be collected by lowering the previously unused disposable, polyethylene, bottom-filling bailer into the well.
- When bailer is completely full, carefully retract the bailer from the well casing.
- Using a previously unused, new, bottom-emptying device, to minimize agitation of the water, transfer the water from the bailer to the sample containers.
- When sampling for volatile constituents (VOA's), the water samples will be collected in 40-ml glass vials (preserved as required by the analyses requested). Precautions will be taken to prevent capturing air bubbles in the vials.
- Upon filling, each vial will be immediately capped with a Teflon septum and plastic screw cap. The vial will be checked for air bubbles by inverting and gently tapping the vial. If any bubbles are visible, the vial will be refilled and confirmed to be free of any air bubbles.
- At a minimum, all samples will be labeled with the following information:

Sample ID	Date and Time Sample Collected
Location	Sampler's Initials
Project Number	Analyses Requested

- Sample information will be documented on the Chain-of-Custody form.

- All samples will be placed in an ice chest, chilled to a temperature of 4°C. The ice chest will remain in the custody of the sampler until it is transferred to the courier service for delivery at the analytical laboratory for analyses. Any and all transfer of sample custody must be documented on the Chain-of-Custody form with the name, signature, affiliation, date and time of the persons releasing and receiving custody of the samples.

- Upon completion of the sampling activities, each well shall be closed and secured by replacing the well cap and securing the lock.
- Dispose of gloves, bailers, bottom-emptying devices, and bailing line after each use.

Appendix E
Site Safety Plan

SITE SAFETY PLAN

1.0 INTRODUCTION

This Site Specific Safety Plan has been prepared to minimize the threat of serious injury to workers engaged in sampling activities while implementing the workplan for ***the Additional Subsurface Investigation, Former Dutra Trucking***. Winzler & Kelly, Consulting Engineers of Eureka, California have prepared this plan under contract to the HCDPW. All Winzler & Kelly personnel will be briefed on the site safety plan and will have access to the plan at all times.

This Site Safety Plan offers guidelines and precautions for employees of Winzler & Kelly. It is the responsibility of every person working on the project site to behave cautiously and avoid actions or situations that could jeopardize his or her own safety and well being. Winzler & Kelly is not responsible for the actions of employees of other contractors or their sub-contractors, but will work with them to create the safest possible environment.

Winzler & Kelly is not responsible or liable for the injuries of any person working on the project site with the exception of Winzler & Kelly employees, to the extent that they are covered by Winzler & Kelly's Worker's Compensation Insurance.

1.1 Site Safety Officer

The Winzler & Kelly site safety officer will be Colleen Ellis. In her absence, Kenneth Thiessen will act as Site Safety Officer. The site safety officer is responsible for insuring that safe work practices and emergency response procedures are followed.

2.0 EMERGENCY RESPONSE

The site safety officer will carry a mobile phone in case emergency services are required. Dialing 911 on the telephone will provide access to ambulance, fire, and police services. Due to the remote location of the site and distance to the nearest hospital, emergency medical technical personnel should be contacted immediately in case of emergency.

2.1 Emergency Information

Ambulance:		911
Hospital:	Mad River Community Hospital, 3800 Janes Road, Arcata	822-3621
Poison Control Center:		911
Police		911
Fire Department:		911
Agency Contact:	Robert Stone, HCDEH	268-2239

Emergency Contacts:

Project Manager	Kenneth Thiessen	(707) 443-8326
Site Safety Officer/ Alternate	Colleen Ellis / Kenneth Thiessen	(707) 443-8326
Client (Site)	Frank Dutra	(530) 629-2660

Mad River Community Hospital is the nearest hospital to the site. The directions to the hospital are:

- Head southwest on Boyd Road
- Turn right (east) onto Giuntoli Lane
- Giuntoli becomes Janes Road
- Mad River Community Hospital is located on the left side, 3800 Janes Road, Arcata.

3.0 GENERAL SAFE WORK PRACTICES

All personnel on site will receive the following instructions:

- While on site, wear general work clothes: hard hat, chemical resistant safety boots, long pants, and cloth work clothing.
- Keep hands away from face during times when they might be contaminated.
- Do not eat, drink, or smoke during times when hands might be contaminated.
- Stay clear of heavy machinery in operation unless involved in sampling.
- Beware of the cables on the drilling rig, they can swing around and hit people. Wear your hard hat and stay aware when near the drill rig.
- Take measures, such as installing barricades, to keep the public out of the drilling and sampling areas.

4.0 HAZARDS

The known hazards associated with this site are:

A. Trip or fall injury on rocks, gravel, or debris;

B. Physical injury from sampling equipment and drill rig;

C. Physical injury from underground utilities;

D. Chemical injury from contaminants potentially existing in soil and water.

4.1 Physical Injury/Accident Hazards (A)

A. Employees must pay attention to rocks, ditches, loose, or wet soil, which may cause them to trip.

B. Employees need to remain in an alert, well-rested state in order to evaluate conditions at the site, which are unfamiliar to them.

4.2 Drilling Rig Hazards (B)

A. The cables from the drilling rig can break and fly out causing injury. The hydraulic lines to the auger can also break causing a release of hydraulic fluid that could get on employees nearby. Employees must wear hard hats and eye protection when working near the drill rig.

4.3 Underground Utilities (C)

A. Underground utilities will be located prior to conducting subsurface work.

B. Employees will take precautions so that drillers do not hit utilities. If utilities are encountered, "live" wires will not be touched, avoid contact with the drill rig in case it becomes energized, and notify appropriate agencies as soon as possible (PG&E Emergency Number 800-743-5000)

4.4 Injury from Chemical Contaminants in the Soil and Water (D)

Petroleum products, particularly diesel fuel and gasoline, are the contaminants of concern at this site. Petroleum products contain benzene, toluene, ethylbenzene, and xylenes. Benzene is considered to be carcinogenic to humans.

The hazards and safe working practices for chemicals expected to be found in the soil or water are summarized below:

Hazardous Substance	**Hazard**	**Safe Work Practice**
Diesel	May cause mild dermatitis with prolonged skin contact. Skin cancer has been reported in rats with repeated applications of diesel fuel. Inhalation of high concentrations may cause mild narcotic effects. OSHA exposure limit has not been determined.	Protect skin from exposure by always wearing nitrile gloves, protective coveralls, and chemical resistant boots when sampling (Level D). If monitoring indicates high levels of petroleum products, an air purifying respirator with nuisance dust and organic vapor cartridges will be worn (Modified Level C).

Hazardous Substance	Hazard	Safe Work Practice
Gasoline	Extremely volatile and flammable liquid. Inhalation of high concentrations can cause lung damage. May cause skin or eye irritation. Components of gasoline (benzene) can cause cancer or reproductive toxicity. PEL1: None established. See Benzene STEL2: None established. See Benzene	Same as above.
Benzene	Prolonged and repeated exposures cause anemia, lymphoma, and other cancers in lab animals. Causes skin and eye irritation. OSHA exposure limits: PEL: 1 ppm STEL: 5 ppm	Same as above, See Air Monitoring Procedures below regarding benzene levels.
Toluene	Eye and respiratory irritant. PEL: 100 ppm STEL: 150 ppm	Same as above.
Ethylbenzene	Severely irritating to eyes at high concentrations. May cause dizziness. Highly irritating to mucous membranes of the nose. PEL: 100 ppm STEL: 125 ppm	Same as above.
Xylenes	Toxic: Vapors in high concentration are anesthetic. Irritant to skin and upper respiratory system. PEL: 100 ppm STEL: 150 ppm	Same as above.

4.5 Air Monitoring Program

The likelihood of encountering hazardous levels of hydrocarbons during the performance of the work outlined in the workplan is considered to be low due to the low concentrations found in earlier sampling. However, the air in the employees' breathing zone will be monitored periodically for the presence of hydrocarbons with a PID3. If the PID measures a level of 50

1 PEL is the Permissible Exposure Limit for a chemical exposure. It is a time weighted average (TWA) concentration of chemicals allowed over an 8-hour work shift (not to be exceeded).

2 STEL is a Short Term Exposure Limit for chemical concentrations (not to be exceeded) over a 15 minute time period.

3 PID is a Photo Ionization Detector used to detect non-specific hydrocarbon vapor levels.

ppm, for a sustained period of time (15 minutes), then the benzene levels will be checked with a Dreager or Sensidyne tube. If benzene concentrations exceed 1.0 ppm (the lowest detection limit of the Drager tube), employees will immediately don their half face respirators with organic vapor cartridges (modified Level C).

If the PID measures hydrocarbon levels above 100 ppm, employees will immediately don their half face respirators with organic vapor cartridges (modified Level C).

Respirators will continue to be worn until the PID indicates total petroleum below 50 ppm and the Drager tube measures a level less than 1.0 ppm.

If dusty conditions develop in the contaminated area, the ground will be wetted with water.

5.0 DECONTAMINATION

All sampling equipment and personnel will be appropriately decontaminated between each sampling event and before leaving the site, in the decontamination area. Sampling tools, faces, hands and respirators will be washed first with clear water and Alconox/Liquinox, then rinsed with water. Disposable items and contaminated decontamination rinseate will be transferred to 55-gallon drums and stored on site, pending analytic results. These items and rinseate will then be disposed of in the appropriate manner.

6.0 DOCUMENTATION

The following safety records will be completed and maintained with the project files.

Site Safety Review

Project Number: 90-1297-01049

Site Location: 5005 Boyd Road, Arcata CA

Before beginning the job, Winzler & Kelly Employees on site will sign the chart below to indicate that they have read and understood the Site Safety Plan, and will follow the recommended safe work practices.

Initial Safety Training Documentation

Date	Name	Signature
	Site Safety Officer	

Changed Conditions at Work Site
Safety Update Documentation

Project Number: 90-1297-01049

Project Location: 5005 Boyd Road, Arcata CA

If conditions change at the work site, new safety hazards, and corresponding safe work practices should be noted below. Before entering the site again, employees will sign below to indicate that they understand the changed conditions and additional safe work practices.

Date	New Hazard	**New Safe Work Practice(s)**

Employees acknowledge & understand new hazards and work practices above.

Date ______Name______________________Signature ________________________

Date ______Name______________________Signature ________________________

Date ______Name______________________Signature ________________________

Date ______Name______________________Signature ________________________